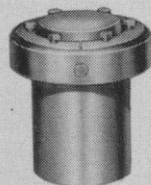
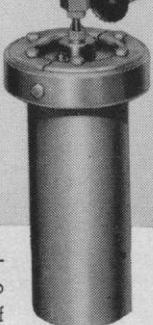
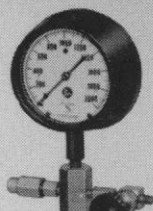
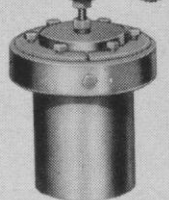
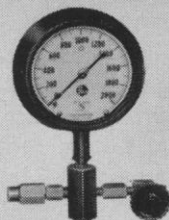


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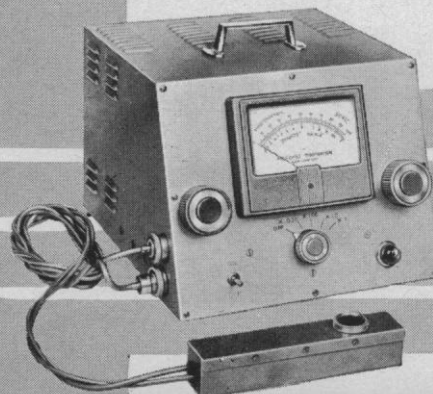
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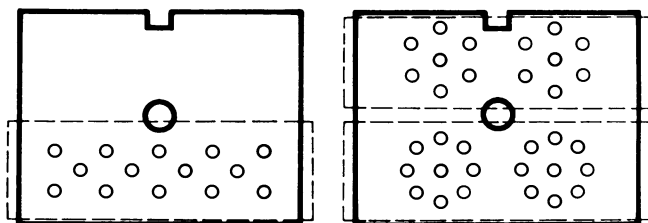
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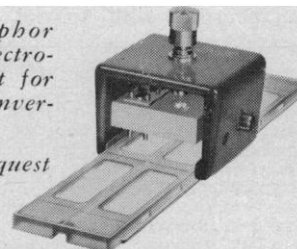
With an immunodiffusion set 6800A-7, Ouchterlony-type double diffusion tests on a **micro-scale** (7 μ l samples) can now be made routinely. Semi-quantitative results can be obtained by making a series of dilutions on a single microslide. This set, which contains two dies producing 3mm diameter sample and anti-serum wells in the arrangements shown above, has a processing capacity of 288 samples/day. These dies fit a handy gel punch also delivered with LKB's immunoelectrophoresis equipment.

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ensured, since the various samples being compared or the serial dilutions are reacted simultaneously on a single microslide. The results, besides being visible at a glance and easy to compare, are thus *more strictly reproducible*. The greatly diminished consumption of antiserum permits a much larger number of analyses to be made from each batch of antiserum. The frequency with which reference standards must be set up is reduced, and the number of directly comparable analyses is increased. The microtechnique is especially suitable for mass investigations for screening and statistical purposes.

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New Products

Direct reading magnetometer (model V-4931DR) is a proton free precession instrument for the measurement of magnetic field from 20,000 to 100,000 gamma. The system uses the proton principle in conjunction with phase-lock circuitry to present the readout of magnetic field intensity on a digital counter and on a strip-chart recorder. The phase-lock system essentially multiplies the precession frequency of the protons in the sensor by the proton constant to provide absolute field intensity. The method is said to yield a highly stable signal, reduce system sensitivity to the effects of ambient noise fields by at least an order of magnitude, and give relative freedom from modulation effects in the precession signal. System response exceeds by two orders of magnitude the steepest field gradients encountered in shipboard surveys, according to the manufacturer. Accuracy is said to be ± 1 gamma. The total range of the instrument is covered in overlapping steps that may be specified by the purchaser.—J.S. (Varian Associates, 611 Hansen Way, Palo Alto, Calif.)

Circle 1 on Readers' Service card

"Intravital" microscope is an integral microscope, specimen holder, and manipulator for direct observation of *in situ* studies on animals as large as dogs. The animal is placed on a 20-by 11-inch mechanical stage mounted on ball bearings with coaxial controls

for the coarse cross motion. For smaller animals there is an attachable holder and trough with single-lever cross motion and adjustable range of motion. The stereo microscope has coaxial coarse and fine focusing and can be swung out of the way when necessary. The height of this assembly is adjustable by a crank which controls a vertical screw. The whole apparatus is mounted on a heavy base. Applications include observation of tissue, organs, and cells, effects of experimental drugs, and structure and function of microcirculation. In addition, conversion to photography and cinematography is available.—R.L.B. (E. Leitz, Inc., 468 Park Avenue South, New York 16)

Circle 2 on Readers' Service card

Microminiature transparent electrical conductors have been developed for use in electroluminescent x-y coordinate display panels. The transparent conductors consist of aluminosilicate glass microcane that is 0.0025 inch in diameter. Each strand is coated with a metal oxide electrically conductive film fused into the surface of the glass. Being marketed initially are 2-inch-long arrays containing 300 parallel strands of conductors in a width of 1 inch. Diameter of the glass wires, the number of fibers per inch of width of the array, and the size of the array, can be varied to meet individual needs. Arrays larger than the 1-by-2-inch size are said to be feasible. Resistivity of the electrically conductive coating is approximately 80 ohm/in.² and it permits light transmission of approximately 70 percent. Tensile strength of the finished fibers lies between 12,000 and 50,000 lb/in.²—J.S. (Corning Glass Works, Corning, N.Y.)

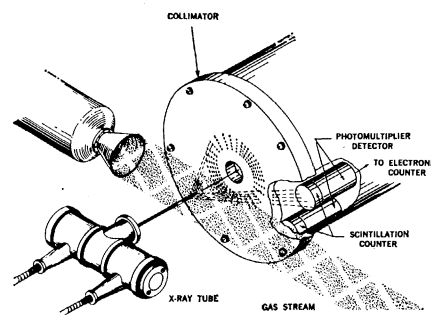
Circle 3 on Readers' Service card

Electron microanalyzer (model AGB-1) irradiates a specimen with energetic electrons causing the material to emit its characteristic x-radiation. By the use of one of the x-ray spectrographic

accessories this x-radiation can be detected and related qualitatively and quantitatively to a particular element in the specimen. The microanalyzer features an electron beam voltage adjustable from 2 to 50 kv with a scanning area of 2 by 2 mm or less. Six channels of readout are available, so that up to four spectrometers, a backscatter attachment, and the specimen current facility can be operated simultaneously. Both air-path and vacuum-path spectrometers are available, as are digital readout, additional recorders, and other accessories. Applications of this method include analysis of biological materials, physical, chemical and atomic energy research, and numerous industrial uses.—R.L.B. (Elion Instruments, Inc., U.S. Route 130 North, Burlington, N.J.)

Circle 4 on Readers' Service card

X-ray densitometer is designed for the measurement of the local density of a gas, and especially for the study of plasmas and rocket-nozzle exhaust streams. The instrument measures the small localized volume of gas defined by the intersection of a collimated x-ray beam and a similarly collimated viewing path. The technique used takes advantage of the direct relationship between the mass density sought and the total electron density in the defined volume. The electrons, whether bound or free, act as scattering centers and can be counted by measuring the scattering of the beam of moderately hard



x-rays employed. The x-ray energy is sufficiently high that the scattering from either bound or free electrons is essentially noncoherent. The amount of x-rays scattered into a detector is proportional only to the total electron density in the gas and not to its chemical or thermodynamic state or to stream velocity, providing that the gas is electrically neutral. Measurement of local density in reacting, dissociating, or ionized gas is possible. With mixtures containing hydrogen, the fraction of hydrogen must be known. Density can

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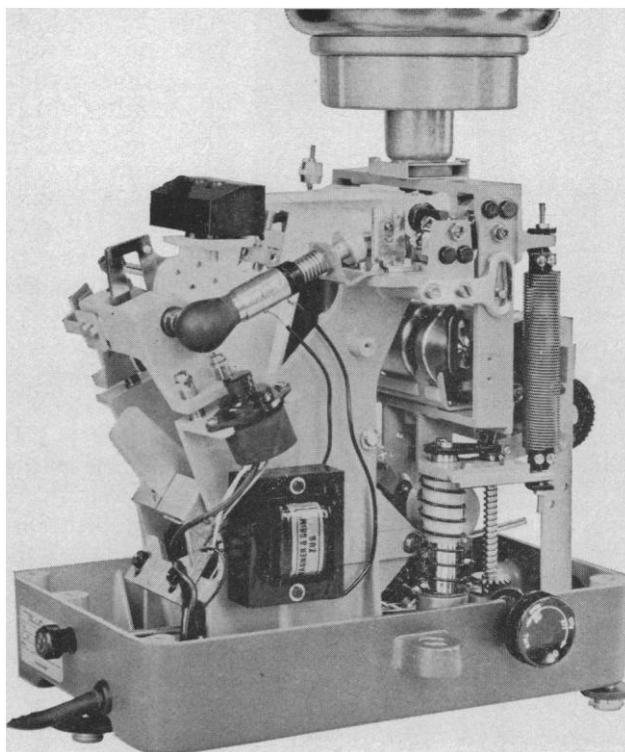
Robert L. Bowman (R.L.B.), with the assistance of Denis J. Prager, Laboratory of Technical Development, National Heart Institute, Bethesda 14, Md. (medical electronics and biomedical laboratory equipment).

Joshua Stern (J.S.), Basic Instrumentation Section, National Bureau of Standards, Washington 25, D.C. (physics, computing, electronics, and nuclear equipment).

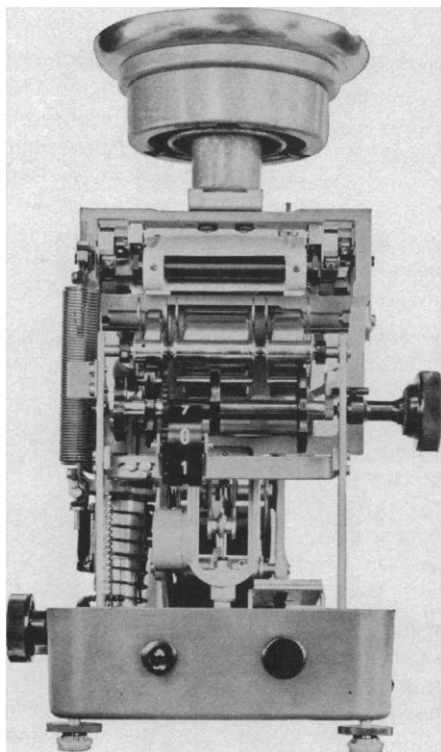
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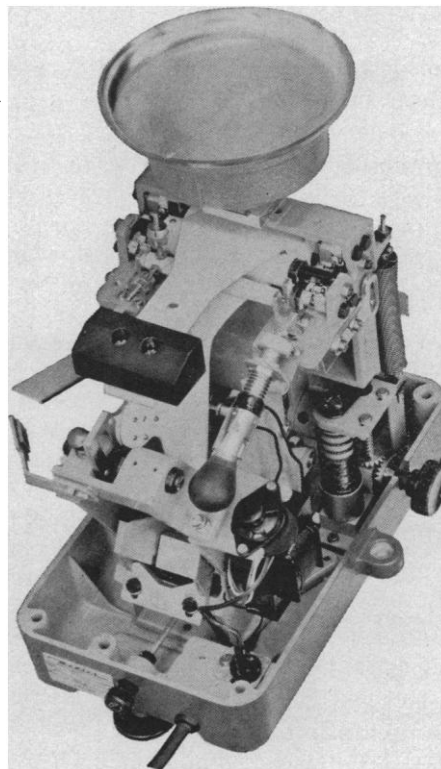
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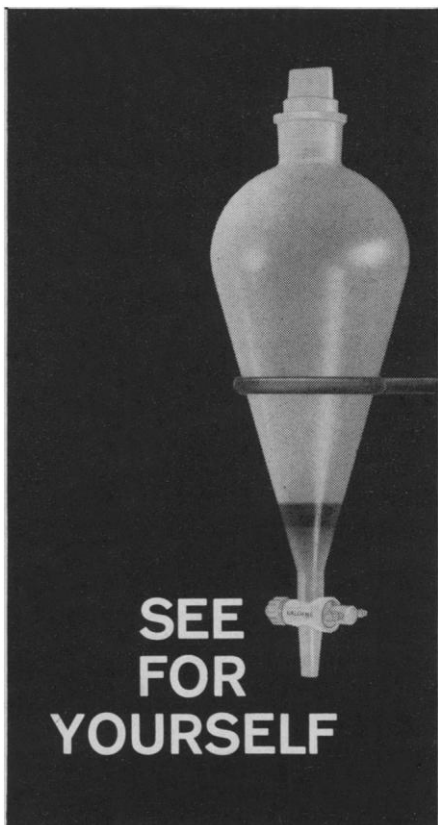
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be measured over the range of density ratio $\rho/\rho^0 = 10$ to 0.0001, where $\rho^0 = 1.288 \times 10^{-3}$ g/cm³. Accuracy is limited at high densities by secondary scattering and at low densities by statistical considerations. Accuracy is said to be better than ± 1 percent at density ratio 10, and well within ± 5 percent at density ratio 10^{-4} . Typical measurement time ranges from 0.1 sec to 10 sec.—J.S. (Itek Corp., 1450 Page Mill Rd., Palo Alto, Calif.)

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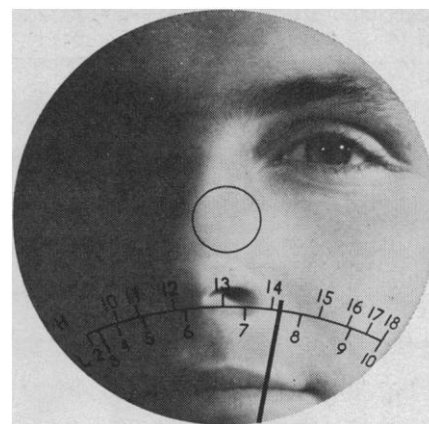
Micrometer incorporates a number of design features that are intended to improve ease of reading and hence to reduce errors. To eliminate parallax, the thimble and vernier graduations are on a level with each other. A direct-reading digit display on the thimble allows reading to 0.0005 inch, so that the need for reading a 0.0025-inch scale is eliminated completely. Oblique lines for the 0.100-inch graduations are designed to permit the figure relating to each line to be visible in all reading positions. Carbide measuring faces are used. A setting device allows the thimble to be reset radially or axially.—J.S. (Swiss Precision Instruments, 901 Hyperion Ave., Los Angeles 29, Calif.)

Circle 6 on Readers' Service card

Biological fuel cell which utilizes the energy of bacterial activity can operate for lengthy periods of time and is available as a kit. The 12-cell educational model will produce up to 6 volts at 40 ma, enough to light a small bulb or power a transistor radio. The kit is simple to assemble and once set up needs only occasional food and water. The individual cells are plastic pill bottles filled with powdered brown rice husks and harmless bacteria. Metal plates and wires collect the current to make up a battery of 12 cells.—R.L.B. (Bulk Distributor Corp., P.O. Box 1465, Tacoma 1, Wash.)

Circle 7 on Readers' Service card

Constant-temperature heater permits interchangeable module blocks to be inserted into a recessed chamber or well, for controlled heating. Temperatures are fully adjustable throughout the range from ambient to $+130^\circ\text{C}$. Control sensitivity is $\pm 0.5^\circ\text{C}$. The economical "Temp-Blok" is designed for incubation and inactivation of cultures, enzyme reactions, blood urea nitrogen determinations, melting and boiling points, and a variety of industrial and



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clinical laboratory procedures. Light-sensitive specimens can be shielded by using a separate stainless-steel cover. The interchangeable heating blocks come in seven standard sizes to hold varied sizes of test and culture tubes ranging from 6 to 25 mm diameter. Custom modules can also be supplied with other cavity diameters. The heating blocks are black anodized, machined aluminum, and measure 4 inches wide by 3 inches deep by 2 inches high. The heater base is cast aluminum, and measures 8 by 5 by 3 inches high. The unit uses a low-density heater with pilot and cycle lights and an adjustable, bi-metallic thermostat. Four neoprene feet cushion the unit and protect the bench top. The unit may be suspended above the bench with a threaded support rod that screws into the rear. Bulletin 325.—R.L.B. (Lab-Line Instruments, Inc., 3070 W. Grand Ave., Chicago 22, Ill.)

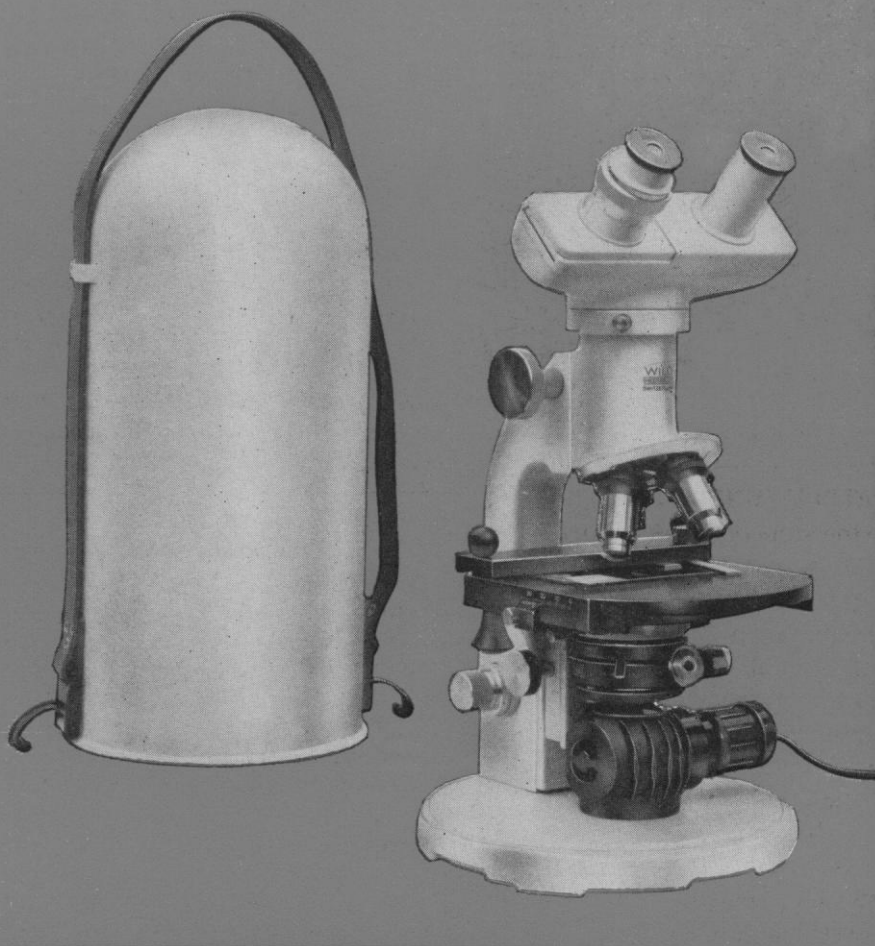
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Automatic reagent dispenser is designed for operation with automatic fraction collectors. It permits accurate addition of one or two reagents to each fraction during the fraction-collecting run. As a result, technician time for manual pipetting is completely eliminated, as are also the inaccuracies of measurement due to human variability. Dispensed volumes, ranging from 200 μ l to 12.5 ml, are accurate to ± 0.5 percent and reproducible within ± 0.5 μ l. A wide variety of reagent chemicals can be handled by the dispenser, because all parts of the pumping system in contact with the reagents are chemically inert.—R.L.B. (Research Specialties Co., 200 S. Garrard Blvd., Richmond, Calif.)

Circle 9 on Readers' Service card

Radiant energy heating lamp (model L-85) is designed to provide a source of high temperature for x-ray diffraction, hot-stage microscopy, permeability studies, zone refining, and for specimen heating during mechanical test. The lamp is said to be capable of heating a specimen locally to 800°C, and a combination of two lamps develops temperatures as high as 1100°C. The area of highest heating, where rays are focused, is located 5 inches from the front reflector flange. Each lamp is supplied with a 60-ft³/min air cooling system for filament cooling. The lamp can be supplied housed in a mobile floor unit fully equipped with a 1000-watt power source, ammeter, power-

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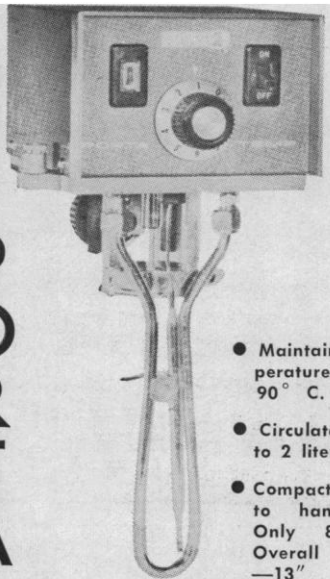
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stat, and necessary fusing. Operation is on 117 volts. The heater is suggested for use in circumstances in which electrical or mechanical interaction between the specimen and its surroundings or the heater must be avoided.—J.S. (MRC Manufacturing Co., Orangeburg, N.Y.)

Circle 10 on Readers' Service card

Piezoelectric accelerometer incorporates miniature impedance-matching electronics as an integral part of the transducer. A piezoelectric sensing element and an emitter-follower are contained in a single unit less than 1 in.³ in volume. This integral package effectively eliminates both noise and signal attenuation problems normally associated with crystal transducers. The accelerometer features 100-ohm output impedance, operating to 250g (peak) from 6 to 6000 cy/sec over temperatures from -65°F to +200°F. Voltage sensitivity is 20 mv (peak)/g (peak) at 77°F and 100 cy/sec with a 50,000-ohm load. Output voltage is limited to volts peak-to-peak without distortion at room temperature. The unit is stud-mounted and is directly interchangeable with almost all accelerometer-emitter-follower (or cathode-follower) systems. It is particularly useful in airborne applications where a separate accelerometer and emitter-follower are not feasible in the limited space available. The accelerometer achieves even distribution of compression across the crystal by using a seismic mass which is point-loaded by a ball and compliant diaphragm. This technique assures "sensitive-axis isolation," maximizing the piezoelectric effect in the desired axis while minimizing response to motion in the cross-axis. Cross-axis response is 5 percent; amplitude linearity is 1 percent. Power requirements are 28 volts ± 2 ma maximum. Weight is 1.5 oz, excluding cable.—R.L.B. (Consolidated Electrodynamics Corp., 360 Sierra Madre Villa, Pasadena, Calif.)

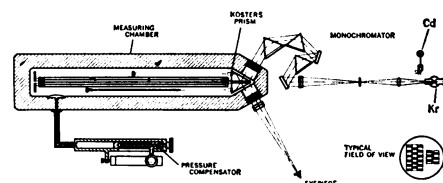
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Low-frequency **two-phase decade oscillator** (type 308G) provides two output signals with 90-deg phase differences from 0.1 cy to 1 kcy/sec. The amplitudes of both signals are maintained essentially constant as frequency is varied. Distortion and hum are said to be negligible and the residual d-c component can be set to zero for both output signals. Frequency can be set from 0.01 to 999 by three digital

dials and a range multiplier. Accuracy of frequency setting is said to be ±2 percent and stability within 0.2 percent after warmup. Phase difference between the two signals is 90 ± 2 deg, and amplitude can be adjusted between 0 and 5.5 volts r.m.s. Both output attenuators have five coarse steps with 1-percent accuracy and a continuously variable vernier between steps, adjustable with 5-percent accuracy. Output voltage is uniform within 3 percent over the entire frequency range without adjustment. An output meter permits reading of either reference or quadrature component amplitude with 3-percent accuracy.—J.S. (AD-Yu Electronics, Inc., 249 Terhune Ave., Passaic, N.J.)

Circle 12 on Readers' Service card

Length comparator is capable of measuring gage blocks of any length up to 1 m by using interferometric principles. Measurement is made with light of the krypton-86 orange-red line. The comparator consists of a krypton-lamp light source, a collimator, a triple-prism monochromator, a Koesters prism that separates the light into two coherent beams, a measuring trough in which the gage block to be measured is placed, and a telescope objective of 1200-mm focal length through which the interference fringes are viewed.

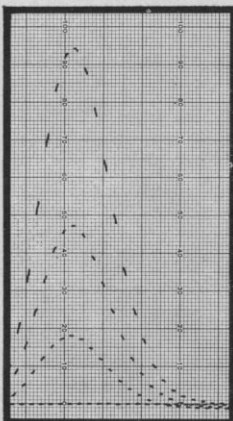


Measurement and control of environmental factors in the trough are provided. Refractive index of the air is determined by means of a built-in vacuum-chamber system. Measurements are made simultaneously in parallel air-filled and evacuated chambers and the difference is shown in the instrument's eyepiece. Air pressure is controlled by adding or removing liquid contained in an elastic body. Volume compensating blocks are provided for different sized gage blocks. Temperature inside the trough is maintained by liquid flowing through hollow chambers in the walls and is controlled by a thermostat. Measurements can be made at various temperatures in order to determine the coefficient of thermal expansion of the gage block. Gage-block temperature is measured by means of a built-in platinum resistance thermometer

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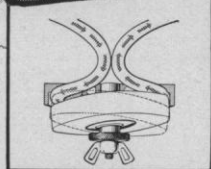
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(1) Avigad, G., Amaral, D., Asensio, C., and Horecker, B. L.: The D-galactose oxidase of *Polyporus cinatus*. *J. Biol. Chem.*, **237**, 2736 (1962).

(2) Cunningham, L., Catlin, B. W., and Privat de Garilhe, M.: A Deoxyribonuclease of *Micrococcus pyogenes*. *J. Am. Chem. Soc.*, **78**, 4642 (1956).



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and two thermocouples. Accuracy of temperature measurement is said to be $\pm 0.001^\circ\text{C}$. Moisture is removed from the air in the measuring trough by pumping through a dehumidifying system. Rotation of mirrors and other motions are produced by oil-pressure controls without friction or lost motion and without generation of heat within the trough. Whole-number readings of interference fringes are obtained by adjusting the air-pressure compensator. Fractional values resulting from the refraction of the air in the measuring trough are subtracted from the whole-number readings to give vacuum values. —J.S. (Carl Zeiss, Inc., 444 Fifth Ave., New York 18)

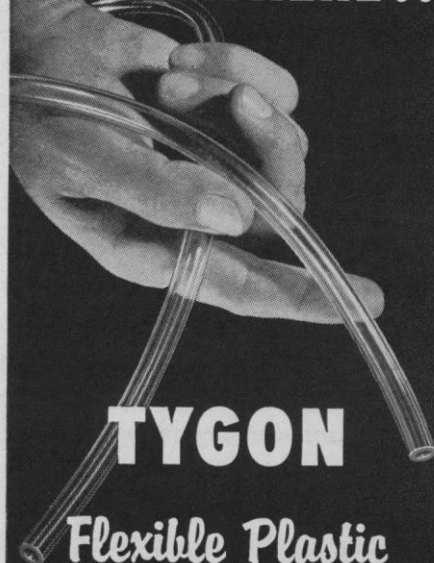
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Wet analysis kit is designed to perform titrations, oxidation-reduction, and pH measurements with a minimum of set-up time. This integrated instrument consists of variable-speed magnetic stirrer and specially designed support bar, clamps, and burettes. The pH millivolt meter probe, along with two burettes or one burette and a thermometer, can be suspended in the test solution at once, so that simultaneous redox and pH measurements can be made, as well as titrations. The standard meter reads 0 to 14 pH with a resolution of 0.05 pH and up to 700 mv full scale. Other meters are available, as well as a combined meter and strip-chart recorder. The titra-kit is meant particularly for routine laboratory wet analysis and as an aid in science teaching. —R.L.B. (Analytical Measurements, Inc., 490 Morris Ave., Summit, N.J.)

Circle 14 on Readers' Service card

Trigger delay generator (model 2A) provides controlled delayed pulses for triggering laboratory equipment from either an optical or an electrical input. Optical triggering is obtained by aiming a 5-foot (1.5 m) fiber-optic probe at the luminous event to be studied. A 250- μW signal on the photodiode is sufficient to produce a low-impedance output triggering pulse adjustable from 50 to 500 volts. Thirty attenuation levels are available for the optical input, and input threshold can be adjusted to provide an output pulse when the desired input amplitude is reached. A monitor output permits the optical signal to be observed on an oscilloscope. Superimposed timing marks show both the triggering threshold of the input and the delayed output pulse.

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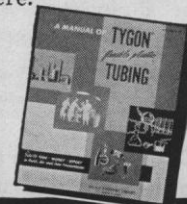
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Circle 15 on Readers' Service card

Solar radiation simulator (model ME6) uses a four-lens quartz optical system to irradiate satellites and other space vehicles with simulated sun radiation. A single simulator can irradiate a satellite of 4-ft diameter with intensity equal to that to which it would be exposed in the space above the earth's atmosphere. The device uses a zoom optical system to permit the intensity of radiation to be reduced or increased by changing the size of the irradiated area. By this means, radiation conditions near planets other than the earth can be simulated.—J.S. (Genarco, Inc., 97-04 Sutphin Blvd., Jamaica 35, N.Y.)

Circle 16 on Readers' Service card

Industrial x-ray film processor (model B) delivers dry, ready-to-read industrial radiographs in 11 minutes. Capacity of the processor is 60 14- by 17-inch (36 by 43 cm) sheets of film per hour. It processes the manufacturer's industrial x-ray film types AA and M in all listed sheet sizes and in continuous lengths up to 17 inches wide at the rate of 16 in./min (41 cm/min). The equipment occupies less than 10 ft² (3 m²) of floor space.—J.S. (Eastman Kodak Co., Rochester, N.Y.)

Circle 17 on Readers' Service card

Digital multimeter (model 2643) measures a-c and d-c voltages from 1 mv to 1000 volts and resistance from 0.1 ohm to 10 megohms. The bridge switching arrangement uses reed relays. Automatic or manual polarity and range switching are provided as stand-

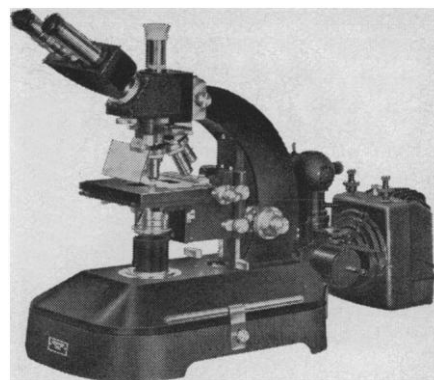
ard features. The measurements are displayed as four decimal digits. A front-panel null meter allows a fifth digit to be resolved. Features mentioned by the manufacturers include overload protection of input circuitry, transistor-resistor logic circuitry, floating operation to 500 volts, 100-db common-mode rejection, optional internal buffer and printout, and noise-rejecting input filtering with variable sensitivity.—J.S. (Houston Instrument Corp., 4950 Terminal Ave., Bellaire 101, Tex.)

Circle 18 on Readers' Service card

Safety fuze interrupter for oceanographic and seismic research prevents accidental detonation of experimental explosive charges by interrupting the safety fuze until arming depth is reached. The device itself contains no explosive. In operation, the desired lengths of fuze are inserted and crimped. The device remains inoperative until a safety pin is manually removed, after which it can only be armed by hydrostatic pressure. At a depth of 25 ft (7.6 m), a pressure diaphragm overcomes a spring force, causing an arming slider to move into position.—J.S. (Daystrom, Inc., Manchester Rd., Poughkeepsie, N.Y.)

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Spectrum-line measuring comparator measures the separation of parallel lines within the range 5 μ to 250 mm and will accept line widths from 5 μ to 1 mm. In operation, light passing through the object being measured from a substage light source, or reflected by an opaque object from an optionally available vertical illumination system, is focused by a projection lens and split into two beams. Part of the light passes to a viewing screen and part through a rotating prism to a slit. The prism produces a periodic scanning of the image on the slit, allowing a multiplier phototube behind the slit to sense the profile of the line for display on a cathode-ray oscilloscope. Synchronization of the horizontal sweep of the oscilloscope with the line scan is accomplished by means of a light-interrupter sector attached to the rotating prism. The mirror that is used to reflect light to the viewing screen has a transparent section that allows light to fall on a transmission recording multiplier phototube. The output of the latter is fed into a cathode follower that in turn drives a density-indicating meter or a recorder. Slits in front of



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each phototube are adjustable to 20-mm width. As the carriage of the comparator is advanced and a line comes into view, two traces appear on the oscilloscope. These travel toward each other, and centering of the line in the optical system is indicated by coincidence of the two traces. One millimeter on the oscilloscope screen corresponds to 1μ on the object; half this misregistration is said to be easily detected. Carriage position is read from a lead-screw dial. The lead screw has a corrector bar assembly said to correct the screw to an accuracy of $\pm 1.0 \mu$ over the total traverse of 250 mm. For alignment of the object, the 34-inch (86 cm) carriage is provided with a 25-mm cross-slide adjustment and a rotational adjustment of ± 3 deg. The instrument is normally supplied with a projection lens (focal length 2.54 cm) providing magnification of 20 at the viewing screen and oscilloscope. Other magnifications or a zoom lens providing variable magnification from 5 to 22 can be supplied. Available on special order are a 100-mm cross traverse, a system for electronic z-axis fringe readout, digitized readout for the lead screw, and an inch version with 50×10^{-6} inch least count.—J.S. (Grant Instruments, 5812 College Ave., Oakland, Calif.)

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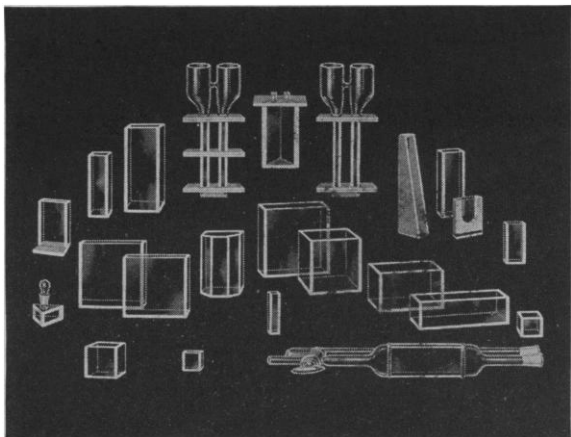
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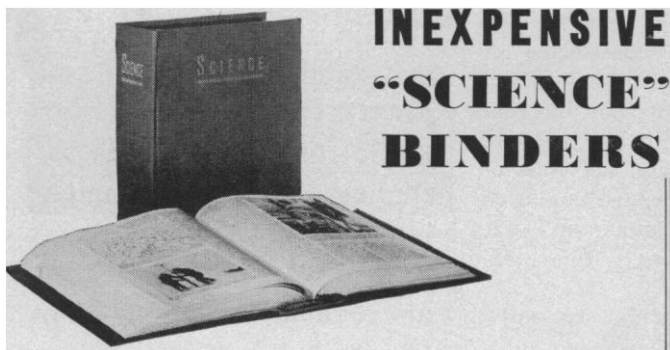
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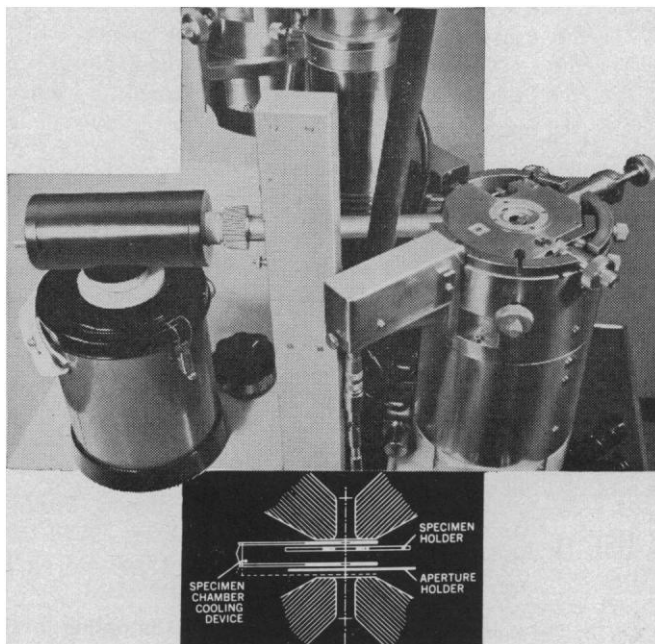
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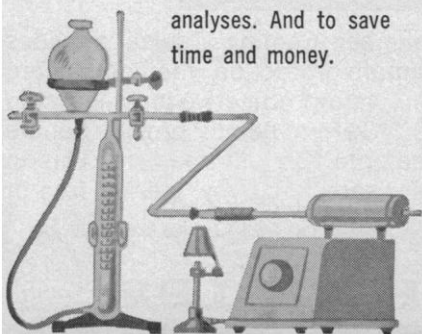
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Sampling oscilloscope concepts and systems are described in a 12-page illustrated report. The sampling oscilloscope permits the observation of phenomena that are too rapid for writing speed of the oscilloscope. It accomplishes this by taking advantage of the repetitive nature of the signal to be observed, sampling a different phase of the signal at each successive repetition and synthesizing the individual signals into a representation of the complete wave form. The report details 11 phases of sampling technology: basic philosophy; pulse definitions and coaxial cable considerations; typical sampling systems; rise-time factors; loop gain; sampling density; dot transient response; random noise smoothing; changing sensitivity; adding d-c offset



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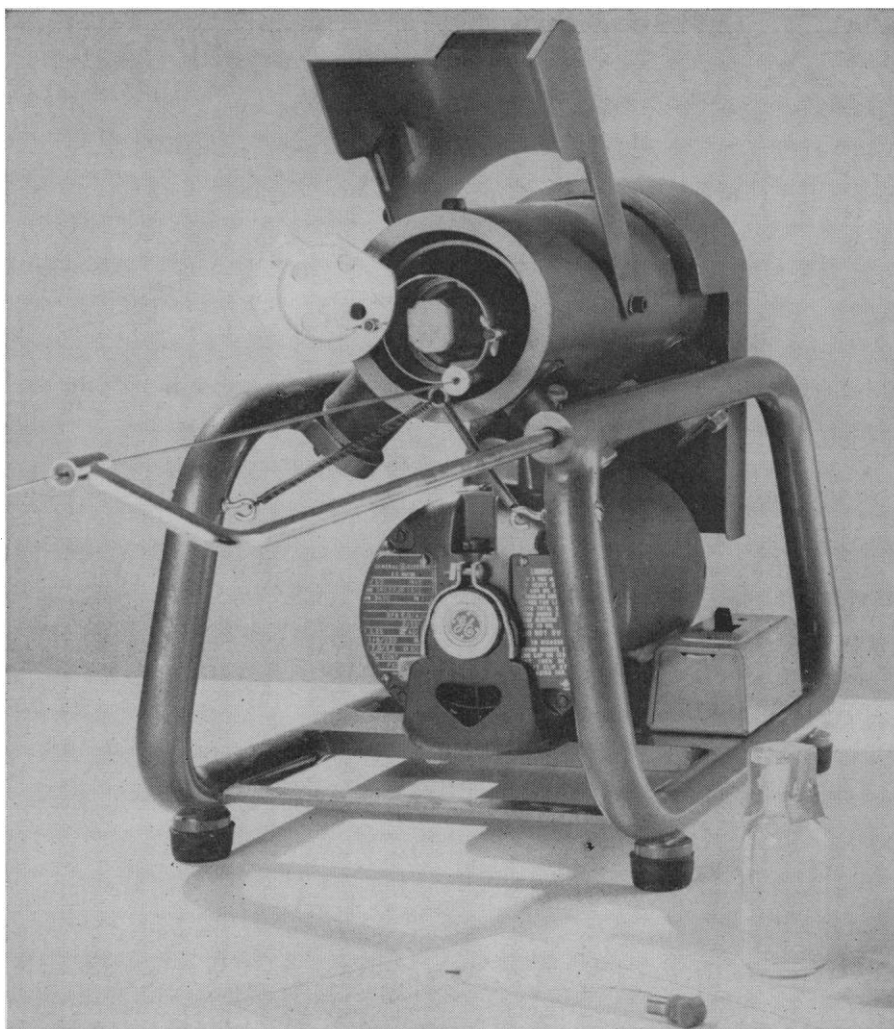
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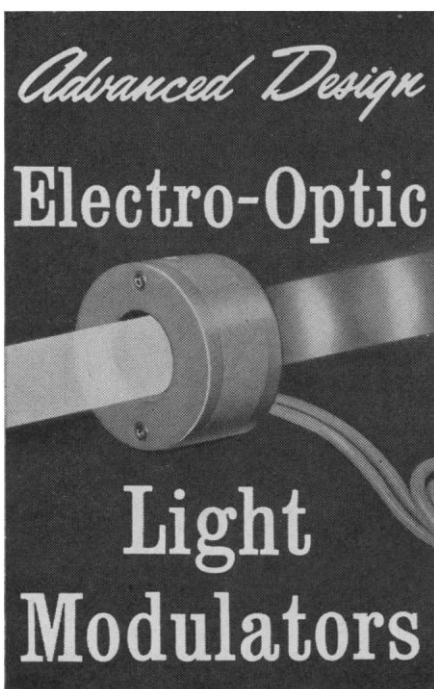
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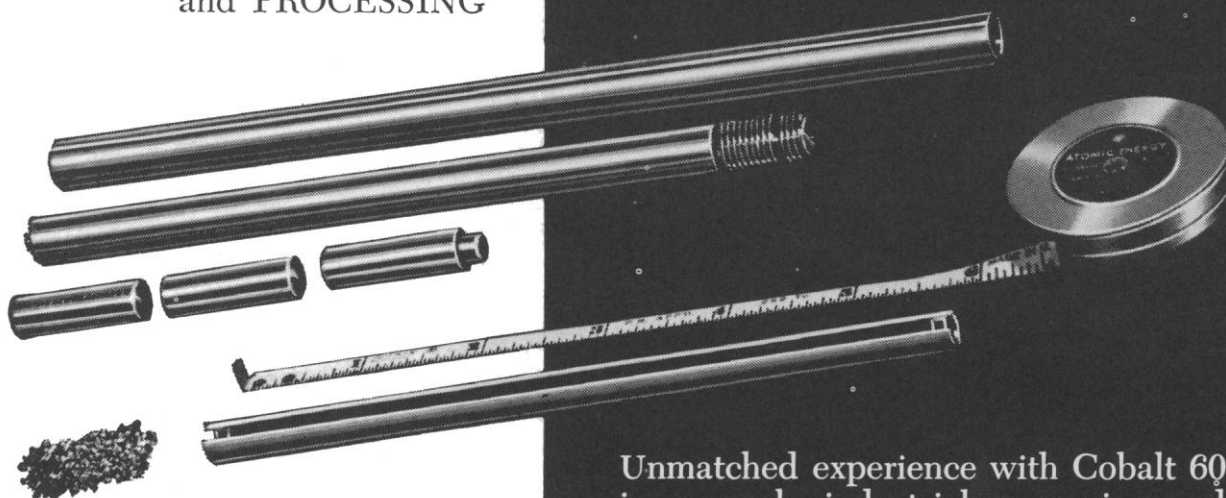
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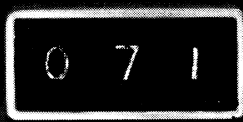
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